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Published in:
Proceedings of Workshop on Residents' Democratic Engagement in Public Housing and Urban Areas: Challenges and Potentials for ICT

Publication date:
2015

Document Version
Peer reviewed version

Link back to DTU Orbit

Citation (APA):
Knudsen, H. H. (2015). The use of social media for improving sustainable energy and building operation. In *Proceedings of Workshop on Residents' Democratic Engagement in Public Housing and Urban Areas: Challenges and Potentials for ICT*

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The use of social media for improving sustainable energy and building operation

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This paper will draw perspectives of the experiences from the housing estate “Eight House”, using the social intranet media “Borigo”. How can Social Intranet Media support sustainable building operation with an overall aim of improving the residents’ sustainable practice? Can local operational managers of the residential area function as change agents in the process? What kind of process is needed? Can the use of social media support communities of practice?

1. Building operators as key stakeholders and change agents?

Acknowledging that residents’ behavior impacts energy consumption as well as the building’s technical performance, researchers demand more knowledge about “what householders do, and why they do as they do in their everyday life, and thus be able to turn these practices in a more energy-reducing direction.” [8. Gram-Hanssen, 2014]

In Denmark one third of all energy consumption is related to households. 80 pct. of that is related to heating and 20 pct. to electric devices etc. [5. DEA, 2014]. Regarding the heating consumption, completely identical houses can have heating consumption that varies with a factor 2-3 depending on residents’ behavior. For comparison the technology of low energy housing has a factor 2 effect on energy consumption. Most of the variation of the heating consumption must be explained “by habits which do not relate to standard socio-economic background variables of the population” [9. Gram-Hanssen, 2014]. “On the basis of different kind of studies, it is suggested that on average 20 pct. of the expected energy savings are not achieved” [7. Gram-Hanssen, 2013].

This paper focuses on the role of the particular group of stakeholders, beyond the residents, which are aware of the residents' behavior and energy consumption - the caretakers or operating managers in the local area. There are app. 500,000 social housing apartments of app. 1.29 million rental units in Denmark.

The public housing agencies in Denmark have a tradition of implementing environmental controlled building operation in residential areas. [11. Jensen et al 2008]. In most of the social housing and in some of the private housing environmental operation of buildings is done with the use of energy management and control of installations using building management systems, BMS. Operating managers take care of the BMS and installations, and they are often supported by experts as energy and environmental consultants at the main office. They monitor energy consumption and detect if some measurements stand out, and they are in daily contact with the residents about subjects relating to their apartments and the technical installations. It makes them key stakeholders when it comes to influence residents’ behavior.

With years of experience in operating in the social housing organizations, I have worked to support the operating managers with information regarding the residents' knowledge of sustainable practices, and “environmentally suitable” use of the home. The following outline of the communication with residents’ draw on that experience. Information on the use of the apartment will primarily be given to the residents when they move into the apartment, often in a resident directory. They receive user manuals of the technical installations, ventilation system, cooker hood etc. made by the producer. Then the information is primarily given by personal letters or as general information in the organizations newsletters and occupant magazines. Some information is given by posters in the staircase. The communication with the residents on the sustainable use of the property takes place in a context where there is a close link between energy savings and comfort, understood as daylight through the windows, a comfortable temperature, the absence of draft from windows and ventilation valves, ventilation to avoid moisture and mold, etc.

Summing up those are the conditions of the field of housing operation:

- User behavior is vital for energy consumption during the operating phase.
- The building operators operate the BMS for heating and ventilation.
- There is a significant need for communication and user feed back
- In that field the operating managers are key stakeholders.

2. Room for improvement of communication with residents

According Gram-Hanssen, neither behavior nor lifestyle approaches are useful when analyzing household energy consumption, "as much of consumption relates to unconscious habits and technological structures which are not very well understood" in behavioral or lifestyle approaches. Gram-Hanssen argues accordingly with a number of other researches, that the practice theoretical approach is more helpful when it comes to understand residents' behavior. This theory understands behavior as practices who are infolded in routines and continually changed and transformed by the collectively shared social and physical structures. [2. Bartiaux, 2014; 7.,8., 9.: Gram-Hanssen 2013, 2014, 2015; 18. Shove 2012].

Following Gram-Hanssen four components are considered as holding together a practice: 1: Technologies and products; 2: Know-how and habits; 3: Institutionalized knowledge and explicit rules, 4: Engagement which "respond to what 'Schatzki' [in "Social Practices" from 1996] call "teleoaffective structures" made of "ends, projects, tasks, purposes, beliefs, emotions and moods".

Using these components on the practice of "heat regulation", as in "Figure 1: Heating regulatory practice", the operation managers handle technologies as the BMS, which is strongly connected to the technical products in the homes such as the heater and thermostats. The operation manager has knowledge that can be useful for residents, such as how it is beneficial for the heating bill to open the thermostats in every room, and that the warm water regulation in the shower works better when the shower head and shower thermostat is not calcified. The know-how and habits of the residents has a potential for improvement according to the experience from the energy- and environment consultants in the social housing companies.

"Know-how and habits are an important component of what constitutes a practice. They represent the routines taken for granted, the things people do without reflecting that they are doing it, and therefore are key when discussing whether a practice may be conceptualized as such or not" [2. Bartiaux F. s.530, 2014].

Heating regulatory practice

	Operation managers	**Residents**
Technologies and products	BMS operation and control system Heating system Ventilation system Warm water supply system	Heater and thermostat Programmable thermostat Thermometer Showerhead and thermostat Ventilation valves for fresh air
Know-how and habits	How to manage the BMS. How to measure the consumption. Setting max. temperature Knowledge of heating regulation	How to manage the thermostats? Remove lime scale from the shower thermostat? Close thermostats when windows are open? How to read the heating bill? The use of curtains?
Institutionalized knowledge and rules	Heating supply systems BMS management Energy Performance Certificates, EPC	General health advices on heating and moisture etc. Energy labels, green accounting etc. Written advices from the Operation Managers
Engagement	Need feedback from residents Manages resource optimizing	Comfort zone Saving money Saving energy

Figure 1: Heating regulatory practice

3. Examples from use of social media in the Eight House in Ørestad Copenhagen

In the 476 Eight House apartments in Ørestad, Copenhagen, the residents use the social intranet media "Borigo", here called "8-book". The Eight House is from 2010 and the apartments are privately owned. Everybody has a profile, and when messages from the board are only given via "8-book", there are incentives for using the media. 8-book is available through world wide web.

Social Media is a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user generated content, which they share, co-create, discuss and modify. Social networking sites are applications that enable users to connect by creating personal information profiles, inviting friends and colleagues to have access to those profiles, and sending e-mails and instant messages between each other. [12. Kaplan 2010]

There have not yet been made systematic research studies of the communication on 8-book, but I will give some examples, and on that basis in the next chapter, I will draw the attention to the possibilities of using social media and strategic communications as a tool of improving knowledge sharing and supporting communities of practice among the residents. [5. Borigo]:

January 22nd, 2014 – programmable thermostats: ST writes that they have bought Danfoss Living Eco thermostats, but they miss "some kind of adaptor", to bring them to use. LA answers ST, and explains where she can get the adaptor. LI ask for information about the system and how it works. LA answers LI and explains about the technical details and that she also needs to buy temperature sensors. KI write and tell about another product which is cheaper, and explain that his family has saved 25 pct. on the heating bill. On February 23rd, LI writes that now they also have bought the programmable thermostats, and that they function all right.
There are only a few more participants in the above thread, but as participants of the larger neighbor community they also meet the neighbors face to face as members of groups as - ST: Photo Group, yoga group, creative group, tour de chambre group etc. and LI: Dinner club and photo group. When neighbors meet in different clubs e.g. the dinner club some of the frequent topics are everyday life in the eight-house.

March 4th, 2014: BS has received a year-end heating bill DKK 5.000 larger than last year's bill, and asks if other neighbors have the same experience? 18 neighbors reply and BS concludes that his consumption is average but still high. JH ask about how to read the heating bill. AL writes: I live in 97 m2 with neighbors on all sides, almost never need open the heat as there are always about 21 degrees in the apartment, uses only 2.700 DKK. every year. HK responds that if BS opens for the heat in his apartment maybe the neighbors will save on their heating bill. SB then reply to BS who started the thread, that there could be a point in that, as both SB and BS hasn't had a neighbor for five months and both have experienced higher heating bills. This illustrates one of the problems the operation managers meet in residential areas. Some neighbors who live in the middle of a building block get their heat from the neighbors. [6. fsb.dk]

May 6th, 2014: Open question from the board regarding fluctuating water temperatures in the warm water supply system. Before that, there had been several threads concerning fluctuating water temperatures among the residents. Some improvements have been made and now they ask the residents for feedback. Residents from app 75 apartments reply. The feedback indicates that the problem is not yet solved. The board decides to send out a questionnaire.

May 12th, 2014: BR asks about heating consumption in similar apartments. Three neighbors respond that they use about half of the mentioned consumption. The fourth neighbor reflects that she prefer to heat instead of wearing an extra sweater etc.

4. From top down information to supporting communities of practice

"There is a tremendous potential to better understand the target audiences by simply "listening" to online conversations". [15. McGloin, 2014]

Kaplan makes a classification of social media based on 1: the richness of the medium and the degree of social presence it allows. 2: the degree of self-disclosure it requires and the type of self-presentation it allows. "The higher the social presence, the larger the social influence that the communication partners have on each other's behavior". [12. Kaplan, 2010] Media differ in the degree of ''social presence''- defined as the acoustic, visual, and physical contact that can be achieved via the media – and media richness is highest in face to face communication, lower for telephone communication and higher for "chat" than communication by e-mail or forums.

The information given today from the operation managers to the residents tends to be top-down communication. Mostly it is written advice: Do this and do not do that. The social housing organization "FSB" have developed green accounting for all residential areas and send it to the boards. Some housing companies use visualization of consumption of energy, displayed on a screen in the apartment or the staircase. Still this is push information. Social media on the other hand is pull media, where the residents attend the communication with the main purpose of getting in contact with other people. 8-book has a calendar which is used by the many different activity groups – e.g. for the announcement of the dinner club meetings every second week and the Yoga and the Pilates every week. When anyone post something at 8-book, they can chose to send an e-mail to all the neighbors about the posting. There is a great deal of buying or selling stuff, and people ask questions about all kind of topics as "can I borrow your printer, bike, drill etc. When you open the intranet page, the most recent updates are visible at "the wall".

Communications top down and bottom up

Fields	**Media**	**Residents**
Heating Bill	Web/ paper	Reading
Green Accounting	Web/ paper	Reading
Visualization of consumption	Web, tablet, phone	Reading (action)
Strategic Communication Courses, Workshops	Campaign Meetings Web, tablet	Meeting, set targets Action
Social media intranet supported communications	Social media intranet, web & e-mail Phone, tablet meetings	Discussion Proposals knowledge sharing
Action and negotiation	Face to face meetings	Social practices

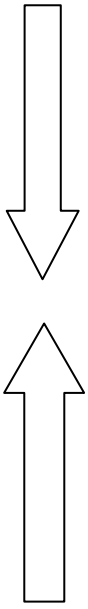

Figure 2. Communications top down and bottom up

Kaplan recommends four pieces of advice for using mobile social media as marketing tool, which are interesting for communications as well: Take in account of user preferences and interest, involve the users through engaging conversations, integrate your activities into your users' life to avoid being a

nuisance, and initiate the creation of user generated content. [12. Kaplan 2012] According to this advice, it seems that the 8-book would be an appropriate media context for operators, if they want to provide information in a media residents already use, where they are already participating in conversations about the heating bill and the new technology, and where the social media is linked to interest in home and everyday life.

With a role as change agents the operation managers have an overall aim of reducing energy and water consumption and improve waste collection. Following the process of Denmark's first CO2-neutral housing area "AB Søpassagen" in Copenhagen and other frontrunners [1. AB S. 2015; 10. Holm 2014] , they can involve the residents in a bottom up process with meetings, where residents set up environmental long term goals for the building block and a strategy and action plan for achieving the goals including a communications strategy. Social media intranet provides a platform for knowledge sharing, information and visualization of consumption.

According to Bilharz et al. the information should be prioritized about "big points" as correct heating and ventilation. They argue that the question is not of reaching "the majority of consumers in general, but rather reaching the critical mass" [3. Bilharz, 2015]. It's an interesting point, because not all residents of social housing have access to www and social intranet media. Then social media primarily supports communication and knowledge sharing among active residents'? As mentioned above, some of the neighbors in "Eight House" meet other neighbors in various activity groups where they also talk about what is written on the "8-book". In some social housing estates it will be possible to provide access to the intranet on a computer in their common house. Other residents can access at the public library and some residents will not be online. They still need to get information at meetings and in written material. Communication at social media intranet can't stand alone and should be supported by meetings.

Also Lave and Wenger's theory about situated learning and "communities of practice" could be helpful when the focus is on: What happens on the social media intranet? What do the residents talk about when it comes to environmental matters? What are their interest and needs of information?
"It (communities of practice) does imply participation in an activity system about which participants share understandings concerning what they are doing and what that means in their lives and for their communities… A community of practice is a set of relations among persons, activity, and world over time and in relation with other tangential and overlapping communities of practice". [14. Lave & Wenger, 1991].

This paper concludes that there is a potential to use social intranet media as a strategic communication tool for sustainable building operations of both private and social housing. It would also be useful to monitor the use of social media. The author of this paper is presently working an application for an industrial Ph.D. in that field in cooperation with Center for Facilities Management at DTU Technical University of Denmark. She is an Architect from the Academy of Fine Arts in Copenhagen, member of the Danish Architects' Association and Master in Professional Communication from Roskilde University. Practice is based on 15 years of working experience from facilities management and building operation as communications consultant and energy- and environmental consultant in social housing organizations.

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